

# **ADJUSTABLE RACK MOUNTABLE COMPUTER TERMINAL MOUNTING SYSTEM**

## **BACKGROUND**

### **5 1. Technical Field**

The present invention relates in general to hardware for computer systems, and, in particular, to a user workspace mounting system for a computer terminal including a keyboard and flat screen monitor for a server rack.

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### **2. Description of Related Art**

Rack mounted keyboard-display units are used in computer installations characterized by rack mounted computers in banks and bays of computer cabinets, such as server farms, routers, and database management intensive computer complexes (financial institutions, insurance companies, stock and commodity dealers and exchanges, and the like). Typical rack mounted keyboard-display units are horizontally adjustable, that is, they are slidable into and out of the cabinet into an aisle, being mounted in or on a sliding drawer or on brackets and fixed rails.

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While this provides for horizontal adjustability, that is adjustability into and out of the cabinet, it does not provide for vertical adjustability, that is, up-and-down adjustability. This presents, at best, a user convenience problem, and at worst an ergonomics and worker safety problem, especially in a workplace or workgroup where there are users of varying heights.

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Thus, a need exists for an end user vertically adjustable rack mounted end user work space, such as a shelf, platform, drawer, or computer terminal including a keyboard-display unit, allowing easy access by a wide range of users.

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## SUMMARY

The system and apparatus described herein provides both horizontal and vertical adjustability, that is adjustability into and out of the cabinet, and up-and-down adjustability. This obviates the user convenience and ergonomics problems of the prior art, and allows for adjustment of the height of the terminal in a workplace or workgroup where there are users of varying heights. The result is a vertically adjustable rack mounted keyboard-display unit allowing easy access by a wide range of users.

An embodiment of the system of our invention provides a computer terminal, including a keyboard display unit, adapted for rack mounting, where the height of keyboard is easily adjustable in the vertical direction, that is, easily adjustable in height relative to the rack, to accommodate worker characteristics. This is accomplished by pivotally mounting the keyboard and display on a bracket, that is a bracket including a pair of frames, where a first frame including its parallel frame elements, is horizontally slidable, and the second frame, including its parallel frame elements, is pivotally mounted on, and vertically adjustable with respect to the first frame. When the end user work space is a computer terminal, the viewing angle of monitor is adjustable with respect to the frame and the keyboard, and the keyboard, monitor, and first and second frames fold into the same plane so that the keyboard, monitor, and bracket and are slidably storable within the cabinet when not in use.

Preferably the display is a flat panel display such as a liquid crystal display, an LCD array display, or a plasma display.

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- As shown in FIG. 1 the bracket has two frames pivoted at a pivot point therebetween. Each frame is generally rectangular and formed of four frame elements. The first frame contains two longitudinal elements and two lateral elements, arrayed to be horizontally
- 5 slidable into and out of the cabinet but not vertically adjustable. The second frame is similarly a rectangular array of four frame elements, and joined at a pivot means at its proximal edge or segment to a distal edge or segment of the first frame of the bracket. The second frame contains two elements, one on each side of the keyboard and display, or other workspace. The second frame is mounted at a pivot means to the first frame and
- 10 is pivotable with respect to the first frame such that its distal edge is capable of vertical movement while its proximal edge (attached to the first frame of the bracket) is vertically fixed. The keyboard and display are pivotally mounted at the vertically movable distal region or edge of the second frame of the bracket for angular and vertical adjustment.
- 15 The first frame of the bracket is inwardly and outwardly slidable with respect to the cabinet, so that a distal edge region of the first frame of the bracket is extendable outwardly of the cabinet, but is fixed in height, that is, vertically fixed, with respect to the rack, and the cabinet.
- 20 The second frame of the bracket is pivotally mounted at its proximal edge region edge to the distal edge region of the first frame of the bracket. The pivotable mounting allows vertical movement of the distal end of the second frame of the bracket, the user work space, as a shelf, platform, or keyboard and the display.
- 25 The end user work space, such as, the keyboard and display are pivotally mounted to the second frame of the bracket at the distal region thereof for angular adjustment of the keyboard and display, for example, during the vertical adjustment of the distal region of the second frame of the bracket.

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It is to be understood that while the invention is described with respect to a computer keyboard and display, the frames, bracket and pivot means described herein may provide a shelf, such as a horizontal shelf, for example, for a computer, items temporarily placed  
5 on a shelf as documents, paperwork, and hardcopy files, memo pads, books, and the like.

In operation the user pulls out the terminal or shelf, causing the horizontally slidable frame of the bracket to extend outward so that its pivot points with the vertically adjustable frame are at or beyond the edge of the rack, to allow pivoting of the pivotable,  
10 vertically adjustable second frame of the bracket.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

FIG 1 shows a bracket for use in a rack mounted computer cabinet.  
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FIG 2 shows a user at a cabinet using a rack mounted terminal, including a vertically adjustable keyboard and display unit

FIG 3 shows a top view of the computer cabinet with a rack mounted terminal, including  
20 a vertically adjustable keyboard and display unit, and with a bracket.

FIG. 4 shows a side elevation of the computer cabinet of FIG. 3.

FIG. 5 includes FIG 5A, FIG. 5B, FIG 5C, AND FIG 5D, illustrating the computer  
25 cabinet with the rack mounted terminal in a sequence of positions.

### **DETAILED DESCRIPTION**

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The nature, objectives, and advantages of the invention will become more apparent to those skilled in the art after considering the following detailed description in connection with the accompanying drawings.

- 5 The system and structure of our invention provides a support or shelf, for example, for an end user work space, such as a platform, shelf, or drawer, or for a computer terminal including a keyboard-display unit adapted for rack mounting, where the height of support or shelf is adjustable in the vertical direction, that is, adjustable in height to accommodate worker characteristics. The viewing angle of monitor is adjustable with respect to the ,
- 10 computer cabinet and rack and to the keyboard, and the keyboard, monitor, and bracket fold into the same plane so that the keyboard, monitor, and bracket are slidably storable in the rack and cabinet when not in use.

- Preferably the display is a flat panel display such as a liquid crystal display, an LCD
- 15 array display, or a plasma display. This is to facilitate compact and slidable storage of the keyboard and display in a rack of the computer cabinet.

- In operation the user pulls out the platform, shelf, drawer, or computer terminal, causing the horizontally slidable, inboard, first frame of the bracket to extend outward so that its
- 20 pivot points, that is, pivot means, with the vertically adjustable, outboard, second frame are at or beyond the edge of the rack. This allows pivoting of the pivotable, vertically adjustable, outboard, second frame of the bracket, providing vertical adjustment of the end user workspace, that is, the shelf or computer terminal. The end user workspace, that is the shelf or computer terminal, including the keyboard and display, are pivotally
- 25 adjustable at the outboard end of the outboard frame of the bracket, to allow for proper working, viewing and keyboarding angles.

In the case of an adjustable computer terminal, the entire terminal, that is, the keyboard and the display, may be independently pivotable about pivot points. Alternatively, the keyboard and the display may be jointly pivotable as a single unit.

5 FIG 1 shows a rack mountable user workspace mounting system comprising a bracket 30 with an end user workspace 20 (illustrated as a computer terminal 21 including a vertically adjustable and pivotable keyboard holder and keyboard unit 23, also referred to as just a keyboard, and a display unit holder and display unit 25, also referred to as just a display, in FIGS 3, 4, and 5A, 5B, 5C, and 5D). The keyboard and or display units may  
10 also be combined with a computer system, such as with laptop computers, or computer tablets where a screen interface allows for user input to be provided by contacting the display screen, The bracket 30 has a first frame 31 extending out of the cabinet 11 and pivotally mounted to a second frame 35 at a pivot 38, with the end user workspace 20 at a second pivot means 39 at the opposite end of the second frame 35 of the bracket, 30. The  
15 frames, 31 and 35 are each rectangular, with longitudinal frames, 3111, 3112, 3511, and 3512, and lateral frames, 3121, 3122, 3521, and 3522.

FIG 2 shows a cabinet 11, in phantom view, with a user workspace 20 (illustrated as a computer terminal 21 including a vertically adjustable and pivotable keyboard 23 and  
20 display unit 25 in FIGS 3, 4, and 5A, 5B, 5C, and 5D) with a bracket 30 having a first frame 31 extending out of the cabinet 11 and pivotally mounted to a second frame 35, with the keyboard 23 and display 25 at the opposite end of the second frame 35 of the bracket, 30.

25 As shown in FIGS 1 and 2, the bracket 30 has two frames; 31 and 35, a first frame 31 that is horizontally slidable into and out of the cabinet 11 and a second frame 35 that joined at its proximal edge or segment 35a to a distal edge or segment 31b of the first frame 31 of the bracket 30. The second frame 35 of the bracket 30 is pivotable, e.g., at a pivot point

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38 with respect to the first frame 31 of the bracket 30 to facilitate vertical adjustment of the work space 20, such as a keyboard and display. The user workspace 20 is pivotally mounted at a distal region or edge 35b of the second frame 35 of the bracket 30 for angular adjustment as the second frame 35 is vertically adjusted. This maintains the user  
5 workspace 20 in horizontal alignment and substantially perpendicular to the cabinet 11.

The first frame 31 of the bracket 30 is inwardly and outwardly slidable with respect to the rack 13 and the cabinet 11 so that a distal edge region 31b of the first frame 31 of the bracket 30 is extendable outwardly of the cabinet 11 but is fixed in height, that is,  
10 vertically fixed, with respect to the cabinet 11.

The first frame 31 of the bracket 30 is movable with respect to the cabinet 11. The movability of the first frame 31 is along rails 151 and 152 within the cabinet 11. Movability may be obtained by rolling with bearings or wheels, or by enhanced  
15 slidability, for example with rails 151 and 152 or frames 3111 and 3112 or both fabricated of lubricious materials. As used herein “lubricious materials” are materials having a coefficient of sliding friction measured against steel below about 0.11. Exemplary of such lubricious materials are polytetrafluoroethylene, high density polyethylene, polyphenylene ether, polypropylene, polystyrene, and  
20 polymethylmethacrylate.

The second frame 35 of the bracket 30 is pivotally mounted at its proximal edge region 35a to the distal edge region 31b of the first frame 31 of the bracket 30. The pivotable mounting allows vertical movement of the user workspace 20, as the platform, shelf,  
25 drawer, or computer terminal 21 including a keyboard 23 and display 25, as shown in FIGS 3, 4, and 5A, 5B, 5C, and 5D.

The keyboard 23 and display 25 of the computer terminal 21 are pivotally mounted to the second, pivotable, or rotatable frame 35 of the bracket 30 at the distal region 35b thereof for angular adjustment of the keyboard 23 and display 25.

- 5 The pivot points 39 provide flexibility for rotation while providing a degree of rigidity. This is a matter of routine engineering choice, and can be provided by friction brakes, pressure detents, thumb action detents, springs, opposed springs, weights, opposed weights, counter weights, and various known fulcrum arrangements and lever arrangements.

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FIG 3 shows a top view of the computer cabinet 11 of FIG 2 with a rack mounted terminal 21 including a vertically adjustable keyboard 23 and display unit 25 and with a bracket 30. The bracket 30 has a first frame 31 extending out of the cabinet 11 and pivotally mounted to a second frame 35 thereof, and the keyboard 23 and display 25 at  
15 the opposite end of the second frame 35 of the bracket 30.

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FIG. 4 shows a side elevation of the computer cabinet 11 of FIGS. 2 and 3 with a rack mounted terminal 21 including a vertically adjustable keyboard 23 and display unit 25 and with a bracket 30. The bracket has a first frame 31 extending out of the cabinet 11 and pivotally mounted to a second frame 35 with the keyboard 23 and display 25 at the  
opposite end of the second frame 35 of the bracket 30.

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FIG. 5 includes FIGS 5A, 5B, 5C, and 5D. FIG 5A illustrates the computer cabinet 11 with the rack mounted terminal 21 still in a planar or storage configuration, being withdrawn from the computer cabinet 11 on the horizontally slidable bracket 30. FIG 5B shows the display 31 angularly rotated or pivoted for viewing and use. FIGS 5C and 5D show the second frame 35 (pivotable frame) of the bracket 30 alternatively rotated

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downward to lower the keyboard 23 and display 25 in FIG 5C and rotated upward to raise the keyboard 23 and display 25 in FIG 5D.

5 While the foregoing disclosure shows a number of illustrative embodiments of the invention, it will be apparent to those skilled in the art that various changes and modifications can be made herein without departing from the scope of the invention as defined by the appended claims. Furthermore, although elements of the invention may be described or claimed in the singular, the plural is contemplated unless limitation to the singular is explicitly stated.